
Status of Test and Analysis Plans For 915 MHz Wind Profiler Replacement Technology Assessment

March 2017 Natural Environments
Day-of-Launch Working Group Meeting

**NASA Marshall Space Flight Center
Natural Environments Branch/EV44**

Barry C. Roberts
barry.c.roberts@nasa.gov

BJ Barbré/Jacobs
robert.e.barbre@nasa.gov



Test Objective

- Evaluate the performance and output of instruments that could replace the current 915-MHz Doppler Radar Wind Profiler (DRWP) networks at the Eastern Range (ER) and Western Range (WR) over a three month (12 week) period.



Instrument Characteristics

- **449-MHz DRWP**

- Output: Altitude (z), wind speed (WS), wind direction (WD), westerly wind component (u), southerly wind component (v), vertical velocity (w), radial velocity (Vr), signal-to-noise ratio, spectral width, quality flag. Output is provided in “ASD” files.
- Data are typically provided every five minutes from ~110-8,000 m with 55 m gate spacing.
 - Low-mode: ~110-3,000 m
 - High-mode: ~3,000-8,000 m
 - Interleaving modes – data from both modes are produced every five minutes
- Vr is typically estimated from combining the current measurement with information from the previous 30 minutes.
- Quality flag ranges from 0-1 and aids meteorological judgement of a valid / invalid profile. MSFC Natural Environments requests to receive all data regardless of quality.
- Settings are configurable



Instrument Characteristics

- **Windcube Lidar**

- 400S system.
- Output: z, WS, WD, u, v, w, Vr, carrier-to-noise ratio, Doppler Spectrum Broadening, quality flags. Output is provided in csv files.
- Data are typically provided, on average, every ~20 seconds from 75-200 m to 7,000-14,000 m with 75-200 m gate spacing, depending on the system and configuration.
 - Need to solidify how data reported at this interval would be used operationally.
- Settings are configurable



Analysis Plan

- Compare measurements from both sources to balloon & profiler measurements
 - Desire one-second balloon data (for consistent block averaging). Automated Meteorological Profiling System (AMPS) Low-Resolution Flight Element is mandatory, AMPS High-Resolution Flight Element is nice-to-have.
 - Desire four launches per day, five days per week; at 6:00 AM, 10:00 AM, 3:00 PM, and 6:00 PM local time.
 - Sample different boundary layer regimes.
 - Take advantage of range daily synoptic balloon launches.
 - Use 915 DRWP data from the ER and WR
 - Tropospheric DRWP data could be used above 3 km at the ER.
 - Perform statistical comparisons of concurrent DRWP / Lidar and balloon data.



Analysis Plan (continued)

- Data availability versus altitude
 - Maximum gate altitude distribution
 - Minimum gate altitude distribution (including an examination of ground clutter)
- Calculate effective vertical resolution via spectral analysis.
- Reliability of each instrument, as feasible, due to limited testing period.
- **Working with the ER and WR to determine final Analysis Plan**



Test Plan

- **Working with the ER and WR to determine detailed test plan**
- Need to determine configuration of operation for each instrument
 - Gate spacing
 - Time interval between profiles
- Need to determine time period spent in each mode
 - For example; 3 weeks in a particular configuration, 2 days per week in each configuration, etc.
- Expect to produce a 12 week testing schedule